

***Remarks/Arguments:***

Applicant wishes to thank the Examiner for his detailed comments. As Examiner has grouped his actions by sections, Applicant will respond to these sections one by one.

**DETAILED ACTION**

***Response to Amendment***

1-2. Examiner has stated:

“The applicant(s) amendment filed on October 8, 2007 has been fully considered and made of record.

“The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action. The rejections below are maintained for the reasons set forth below and repeated merely for the applicant(s) convenience.”

No response is believed to be necessary.

***Election/Restrictions***

3. No response is believed to be necessary.

***Oath/Declaration***

4. No response is believed to be necessary.

***Claim Rejections -35 USC § 103***

5. Examiner has stated:

“Claims 1, 2 and 4 through 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang et al 6,278,591 in view of Cohen 5,141,623.

“Chang discloses a method of making a write pole top for a magnetic head comprising: fabricating a P1 pole (e.g. 302), coils (e.g. 366, 372) and a P2 flux shaping layer (e.g. 312); depositing a P3 layer (e.g. 342) on the P2 flux shaping layer by plating; shaping the P3 layer into a P3 pole tip (at the ABS in Fig. 63); and encapsulating the P3 pole top layer in an encapsulating material (e.g. 380).

“Chang does not teach that the P3 layer is patterned by depositing a CMP stop layer on the P3 layer, depositing at least one sacrificial layer on the CMP stop layer, and removing the at

least one sacrificial layer to leave the P3 pole tip.

"Cohen discloses a pole patterning process that includes depositing a CMP stop layer (e.g. 29, 30) on a P3 layer (e.g. 24 in Fig. 3J), depositing at least one sacrificial layer (e.g. 32) on the CMP stop layer, and removing the at least one sacrificial layer to leave the P3 pole tip (see sequence of Figs. 3G to 3J).

"Regarding Claim(s) 2, Cohen further teaches within the process that the P3 layer material is NiFe (col. 5, lines 30-31).

Regarding Claim(s) 4 through 6, Cohen further teaches that the sacrificial layer is NiFe (col. 5, lines 60-65) and also includes a seed layer (e.g. 27). The sacrificial layer is created by forming a cavity surrounded by photo-resist material (e.g. 29) where the sacrificial material fills or is deposited in the cavity.

"Regarding Claim(s) 7 through 9, Cohen further teaches shaping of the P3 layer is done by ion milling where the sacrificial layer is a mask and the CMP stop layer is a secondary mask. The ion milling is used to bevel sides of the P3 pole tip and is beveled at an angle of 15~ (see Figs. 3F to 3J, and the Tilt angle at Table in col. 6).

"The benefits of the overall pole patterning process of Cohen allows better pole alignment between P3, P2 and P1 with increased data storage densities (col. 3, lines 3-5) and provides a CMP stop layer and sacrificial layer that is more controllable and readily removable (col. 2, lines 66-68).

"It would have been obvious to one of ordinary skill in the art at the time the Invention was made to have modified the method of Chang by utilizing the pole patterning process of Cohen, to provide the benefits of better pole alignment with increased data storage densities and a patterning technique that is more controllable and readily removable."

## 6. Examiner has stated:

"Claims 3 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang et al in view of Cohen et al, as applied to Claim 1 above, and further in view of Tran et al 5,853,900.

"Chang, as modified by Cohen, discloses a manufacturing method as relied upon above. The modified Chang method does not teach that the CMP stop layer is made of  $Al_2O_3$ , i.e. aluminum oxide, and that the CMP stop layer matches the material of the encapsulating material.

"It is noted that the encapsulating material of Chang is an insulating material (see Chang col. 18, lines 42-44) and one of the materials of the CMP stop layer material of Cohen is a photoresist.

"Tran shows that it is known to utilize aluminum oxide as a photoresist material (col. 7, lines 6-14) and that aluminum oxide is a well known and conventional insulating material.

"It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the method of Chang by utilizing aluminum oxide ( $Al_2O_3$ ) as the material for both the CMP stop layer and the encapsulating material to provide the necessary patterning material in the shaping of the P3 layer and to insulate the P3 layer."

## 7. Examiner has stated:

"Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chang et al in view of Cohen et al, as applied to Claim 1 above, and further in view of Ohtsu et al

20040052009.

“Chang, as modified by Cohen, discloses a manufacturing method as relied upon above. The modified Chang method does not teach that the CMP stop layer is made of  $Al_2O_3$ , i.e. aluminum oxide, and that the CMP stop layer matches the material of the encapsulating material.

“It is noted that the encapsulating material of Chang is an insulating material (see Chang col. 18, lines 42-44) and one of the materials of the CMP stop layer material of Cohen is a photoresist.

“Tran shows that it is known to utilize aluminum oxide as a photoresist material (col. 7, lines 6-14) and that aluminum oxide is a well known and conventional insulating material.

“It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the method of Chang by utilizing aluminum oxide ( $Al_2O_3$ ) as the material for both the CMP stop layer and the encapsulating material to provide the necessary patterning material in the shaping of the P3 layer and to insulate the P3 layer.”

In these sections 5-7 above, Examiner has merely repeated his previous rejections. Applicant maintains that the arguments previously submitted in the Response filed 10/8/2007 have not been properly considered, especially as to an understanding of the inherent differences between perpendicular and longitudinal write heads. This issue is addressed in the following response to the Response to Arguments section. It is believed that once this basic point has been properly understood and resolved, allowance of all claims in this application should be granted.

### ***Response to Arguments***

8. Examiner has stated:

“The applicant(s) arguments filed on October 8, 2007 have been fully considered, but they are not persuasive.

“The applicant(s) first argue that the prior art does not teach a write pole for “perpendicular recording”.

“The limitations of “perpendicular recording” has no impact on the process of making the write pole, but has to do with the manner with which the write pole operates, “ (emphasis added-L.G.) “e.g. how the bits of information are transferred from the write pole to the media. Additionally, with respect to the process steps being drawn to a write pole “for perpendicular recording”, because these limitations are recited in the preamble of the claims, they are merely intended use limitations and have not been given patentable weight since the body of the claims (i.e. the process steps recited at lines 3-9 of Claim 1) do not depend upon the preamble for completeness and the process steps are able to stand alone. *In re Hirao*, 535 F.2d 67 190 USPQ 15 (CCPA 1976).”

Applicant respectfully asserts that there are a number of errors and misconceptions exhibited by the Examiner's statements.

First, the statement in the preamble that Claim 1 presents "a method for fabricating a write pole tip for perpendicular recording" establishes the frame of reference for the following elements that comprise the method. It is significant to someone skilled in the art to know that the method to be discussed is for a perpendicular recording head rather than a longitudinal recording head, because this will immediately orient them as to the common usage of the various terms, such as "P3 pole". One skilled in the art knows that longitudinal heads do not commonly use a P3 pole, and further one skilled in the art, as further informed by the teachings of the specification, would understand in a perpendicular head something about the structure of the head, i.e. that the P3 pole is used to concentrate the magnetic flux for perpendicular writing operations, in a manner that a P2 pole of a longitudinal write head does not.

As a rather simple-minded example, let's suppose that we are discussing automobiles and boats, and there is a claim for method of fabricating a drive mechanism for a boat, then listing the elements of the method including "providing a motor" "fabricating a propeller", "mounting said propeller to a drive shaft of said motor", etc. Both are transportation devices, but someone skilled in the art reading the preamble "method of fabricating a drive mechanism for a boat" would be alerted that the frame of reference is that of boats, and certain things are known to those skilled in the art about the structure and operation of boats as opposed to the structure and operation of automobiles or other devices having a drive mechanism. When a skilled person encounters the term "propeller", he knows from the frame of reference (boat) what the element generally does, i.e. rotates as driven by the motor in water to push the vehicle forward. He thus knows that it is far-fetched to

consider the prior art reference of an automobile, merely because is also a transportation device, in rejection of a method of making a boat with a propeller. An examiner, who rejects a boat “propeller” as anticipated by “wheels” on a car as equivalent propulsion mechanisms, is overlooking major structural differences in the two devices, as well as their methods of operation and fabrication. Such thinking would improperly prohibit any advance in boat propulsion design as being anticipated by automobile drive design.

A person skilled in the art knows that there is no propeller, as the term is used in the art, in an automobile, although there is some device that “propels” it. In a similar manner, someone skilled in the art knows that there is no P3 pole in a longitudinal write head. The preamble alerts the skilled person to the perpendicular write head frame of reference, and thus the P3 pole makes sense. In a longitudinal write head, it does not.

Especially when considering the stages in a method of fabrication such as in the present application, there are differences in structure and usage that are very different between the perpendicular head and the longitudinal head. As discussed in the specification, the perpendicular head is especially configured to produce an intense magnetic field which is much smaller in size and more concentrated through the P3 pole than those found in longitudinal write heads, thus producing the perpendicular orientation of the field domains. This is not a trivial difference in structure or operation. As seen in Fig. 1 of the present application, the traditional P2 pole is shortened to become a P2 shaping layer **44**, a gap piece **48** interrupts the P2 layer, so that the P2 pole tip it does not become part of the ABS, as is the practice in longitudinal heads, and magnetic flux is channeled through P2 shaping layer **44** and focused into the P3 layer **52**.

It is obvious that a method of fabrication for this perpendicular type of write head must differ significantly from that of a method of fabrication of a longitudinal

head since even the component layers are different. A skilled person knows this from the frame of reference accessed by the preamble “method for fabricating a write pole tip for perpendicular recording”.

Thus Examiner’s statement above that “The limitations of “perpendicular recording” has no impact on the process of making the write pole, but has to do with the manner with which the write pole operates,” is in error. A longitudinal write head has no equivalent P3 pole or equivalent P2 flux shaping layer, so this has a major impact on a fabrication process of making a write head which does have a P3 pole and P2 flux shaping layer.

The structure produced must necessarily have a defining impact on the process necessary to produce it. It is difficult for two different structures to be fabricated by the same method, and in this case, the method cannot be said to be disclosed by reference to such a different structure.

In addition, with respect to Examiner’s statement that

“these limitations are recited in the preamble of the claims, they are merely intended use limitations and have not been given patentable weight since the body of the claims (i.e. the process steps recited at lines 3-9 of Claim I) do not depend upon the preamble for completeness and the process steps are able to stand alone.”

If, for the sake of argument, the process steps in lines 3-9 are said to stand alone, there is still no corresponding structure in the cited reference, and no teaching in this reference of 3 poles, namely P1, P2 and P3.

Thus Applicant respectfully asserts that it is important that “boats” be compared to “boats” and “perpendicular writing heads” to other “perpendicular writing heads” in examining the claims, least he find propellers on automobiles and P3 poles on longitudinal write heads.

Examiner further states:

“The applicant(s) next argue that with respect to the merits of Chang et al, Chang does not teach P1, a P2 flux shaping layer, and a P3 layer.

“The examiner most respectfully disagrees and the terms of P1, P2 flux shaping layer and P3, are in their broadest sense, *three different magnetic pole layers*. The claims do nothing to distinguish these terms in any other manner.

“(i) P1

“Element 302, while it is referred to by Chang as a first shield layer, is inherently a magnetic pole because it is magnetic and is made from a magnetic material. As evidence of inherency, Chen (U.S. Patent 6,469,875 cited on PTO-892 in the last Office Action) uses element 14 as an exact equivalent of element 302 in Chang. Element 14 in Chen is referred to as a bottom shield S1, which is the very same reference Chang uses, and S1 is a shared pole and is made from a magnetic material (Chen, cot. 3, lines 34+).”

It is agreed that in longitudinal write heads, there is typically a shared S2/P1 pole where the shield material acts also as the P1 pole. This is seen in Fig. 19, P1B/S2 **312**.

Examiner continues:

“(ii) P2 flux shaping layer

“Element 312 of Chang is a P2 flux shaping layer because it is a magnetic pole. i.e. bottom pole tip, and because magnetic layers are inherently capable of flux shaping the magnetic field during operation. As extrinsic evidence, the examiner cites the references to Komuro et al (U.S. Patent 6,034,847, col. 18, lines 20±) and Hanaoka (U.S. Patent 4,141,052, Figs. 3 and 4, col. 2, lines 62+), which clearly document that it is conventional to have magnetic poles shape the flux of a magnetic field during operation.”

Here Examiner misstates the elements of *Chang*. Element **312** is the P1B/S2 element, which is the shared S2 shield and P1 pole, as discussed in the previous paragraph above.

Examiner also misstates that this P1B/S2 **312** is a flux shaping layer. This is a term of art known by those skilled in the art to apply to a P2 layer that is connected to a P3 layer of a perpendicular write head, as shown in Fig. 1 of the present application. The reference frame for the usage of this term is signaled by the preamble which announces that Claim 1 presents “a method for fabricating a

write pole tip for perpendicular recording”. This may be similar to a preamble in a claim saying “a method for fabricating an electrical circuit, comprising:... a conductor”, thus signals a skilled person reading this that “conductor” does not refer to a person who takes tickets on a train. The Preamble indicates the frame of reference for terms of art and in this case skilled persons know that a “P2 shaping layer” is a specific structure, and not a general term for any sort of magnetic layer.

Examiner continues:

“(iii) P3

“Element 342, referred to by Chang as the second pole tip” (emphasis added- L.G.) “layer, exists as a P3 layer because it is a separate magnetic layer, separate magnetic pole, and simply a separate element from elements 302 and 312.”

A P3 layer, as known to those skilled in the art is not defined by simply being a separate element from **302** and **312** (S2/P1). *Chang* himself refers to **342** as “the second pole tip layer”, i.e. P2. Again a “P2 element” or “second pole tip” are known terms in the field, and *Chang* is hardly likely to label a “P3 pole tip” as a “second pole tip”, if he had known of them at the time.

Examiner continues:

“Accordingly, for at least the reasons stated above, the limitations of P1. P2 flux shaping layer, P3, are met by Chang with the elements 302, 312 and 342, respectively.

“More problematic for the applicant(s) is that the arguments they present are much more specific than what is claimed. For example, the features that a write pole for “perpendicular recording” must have a trailing write pole, a leading return, etc., as asserted from page 1 of their specification, are no where recited in the claims. Or that a P2 flux shaping layer has the purpose that is to shape and direct the magnetic flux into the P3 layer, also is not recited in the claims. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).”

Again, it is respectfully asserted that such terms as a “P2 flux shaping layer” are known to those of ordinary skill in the art in this field. For such terms, it is unnecessary to include every functional feature in the claim language to re-define



each term over again, thus producing such redundancies as “a P2 flux shaping layer which has the purpose that is to shape and direct the magnetic flux into the P3 layer”. This is like requiring that a claim read “an electrical circuit by which electricity is channeled within pathways, having a conductor, whereby electricity is conducted from one part of the circuit to another”, etc. It is known by those skilled in the art what a “circuit” is and what a “conductor” is, and what a “P2 flux shaping layer” is, without such explicit recitation.

Even if the term was not known in the field, the usage of the term is explicitly stated and described in the specification. It is not necessary to read limitations from the specification into the claims, if terms themselves are adequately defined.

Examiner is urged to consider that *Chang* himself is obviously aware of the terms of art and their proper usage in regards to a longitudinal write head. He refers to “A bottom first pole tip **312**...a top first pole tip layer **318**..second pole tip **342**” (col.14, line 65 – 66, col.15, lines 27-29) and in Fig.23 as P1B **312**, P1T **318** and P2 **342**. He does not refer to them as “P1, P2 and P3”, or “first, second and third poles”, because these are not accepted terms in referring to elements of a longitudinal head. Longitudinal heads commonly have 2 poles, P1 and P2, of which P1 has been split here into upper and lower portions.

It is respectfully asserted that Examiner misuses these terms of art when trying to redefine a P2 flux shaping layer and P3 of a perpendicular write head to fit his arguments.

Therefore, there are no corresponding stages in the cited reference for any of the following stages in Claim 1 of the present application:

- “(B) depositing a P3 layer on said P2 flux shaping layer;
- C) depositing a CMP stop layer on said P3 layer;

- D) depositing at least one sacrificial layer on said CMP stop layer;
- E) shaping said P3 layer into P3 pole tip;
- F) removing said at least one sacrificial layer to leave said P3 pole tip; and
- G) encapsulating said P3 pole tip in a protective layer."

An examination of the Figs. 57-64, which complete the method of making in *Chang* and the accompanying text do not teach a P3 layer, a CMP layer on P3, or a sacrificial layer on the CMP stop layer. The only reference Applicant can find relating to a sacrificial layer is a discussion of a sacrificial layer **426** on the first top pole tip **318** (*Chang* col. 17, line 46). However, this is a completely different structure and method from the method of the present invention. It cannot be fairly said that the *Chang* reference has the necessary elements alone or in combination to support a rejection on the basis of obviousness.

Applicant will not reproduce all of his previous arguments here, but Examiner is urged to review the previous Response filed on October 8, 2007 and reconsider the arguments presented there.

Thus Applicant respectfully asserts that remaining Claims 1-10, and 13 are allowable over the cited prior art and requests that the rejections as to Claims 1-10, and 13 be withdrawn and these claims be allowed.

Further, as Claim 1 is assertedly an allowable generic or linking claim, it is requested that Claims 11, 12 and 14 be re-entered and allowed so that all Claims 1-14 be allowed.

***Finality of Present Office Action***

It is expected that Examiner would have referenced such terms as “perpendicular heads” in conducting his search. The fact that none have been cited suggests that perhaps Examiner has been looking in the wrong category. It is respectfully suggested that if any appropriate references are to be found, Examiner should search in the field of perpendicular write heads. It has been admitted that perpendicular write heads have been known prior to the present application, as in the discussion of Fig.1 (Prior art). Their structure is thus known to be different from longitudinal write heads, and patents have been granted on subject matter related to these differences.

Thus, it is respectfully asserted that the appropriate field of search is for methods of fabrication of perpendicular write heads. Examiner is respectfully reminded that such a search is necessitated by Examiner’s misunderstanding that perpendicular and longitudinal write heads are equivalent structures made by equivalent methods, and not by any amendments made or material added by Applicant. Thus, it would be unfair to state that anything provided by Applicant in this Response requires that a new search to be made. The subject matter has not changed, there is no new matter added, and Applicant respectfully asserts that it is not appropriate to maintain a Final Rejection of these claims under these circumstances.

**Conclusion:**

Applicant has endeavored to put this case into complete condition for allowance. It is thought that the §103 rejections have been unfounded on the cited references. Applicant therefore respectfully asks that the arguments previously presented be reconsidered, the rejections be withdrawn and that allowance of all claims presently in the case now be granted.

If the Examiner would like to discuss any of the points involved in the Response, he is urged to contact Applicant's Attorney at the numbers included below.

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